FOREWORD

This special issue of *The Ohio Journal of Science* is devoted to Ohio's namesake, the Ohio River. The Ohio River, called "la Belle Rivière" by the French in the 17th Century and the nation's "Industrial Aorta" by the New York Times[1] in the 1950s, has been ignored by environmental scientists and historians, at least compared to other major bodies of water such as the Great Lakes, the Chesapeake Bay, and the Mississippi River (although there are some who say that the Lower Mississippi River should also be called the Ohio River because a greater amount of water comes from the Ohio than from the Upper Mississippi). As a dividing line between several states, the river has been relegated to a role of border rather than system, pathway rather than storage. For example, it serves as the boundary of six states (Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, and Illinois) and three regions of the U.S. Environmental Protection Agency (Philadelphia, Atlanta, and Chicago). Yet it is encompassed by none, so that its environmental conditions are in the hands of many authorities, states, and at least one major interstate compact, but championed by few. The river, which is fed by 528,000 km^2 of watershed covering parts of 14 states and which winds its way 1,600 kilometers from Pittsburgh, Pennsylvania, to Cairo, Illinois, is rarely viewed as an entire system except by the tugboat operators who know it as their home. Like those tugboat captains, scientists must be able to view the river as a whole.

The Ohio River remains a great American river. It has gone from a period as the major route for settlers of the West in the early 19th century to "the greatest concentration of industry on earth"[1] in the mid 20th century to a post-industrial hiatus that has brought back some of the beauty that the early French settlers must have known. We hope that this special issue of *The Ohio Journal of Science* will bring a sense of "systems" as well as history and ecology of the Ohio River to those who are generally unfamiliar with it and will be a stimulus to further scientific and historical research for those who have such an opportunity.

To seek out the history and to understand the ecology of a river that is now more like a series of lakes held back by high-lift dams, we decided to learn and teach about the Ohio River in a special research and educational excursion down the Ohio River in the summer of 1987. Soon named after an historic voyage in the early part of the 19th century, our trip from Pittsburgh to Louisville, with a corps of graduate students and with professors and professionals hopping aboard and off the boat through its entire trip, is described in the first article in this special issue by Mitsch, Mullins, Cavanaugh and Taylor entitled "The 1987 Boatload of Knowledge—Graduate Environmental Research and Education on the Ohio River." The trip's namesake intrigued us enough to have Donald Pitzer of Southern Indiana University describe it to us then in lecture format and now in an article in this journal entitled "The Original Boatload of Knowledge Down the Ohio River: William Maclure's and Robert Owen's Transfer of Science and Education to the Midwest, 1825-1826." Pitzer describes in fine historical detail the characters and setting that led to a boat trip down the Ohio River that winter by utopians, scientists, and educators who were described collectively as having "more learning than ever was before contained in a boat."[2] It could be argued, as Pitzer suggests, that the voyage brought as much scientific and intellectual experience into the Midwestern United States as any single event in our nation's history. The historical theme is continued in a paper by Sherman "Jack" Frost, Ohio's naturalist laureate, on "Resource Development and Conservation History along the Ohio River," where snippets of historical use and abuse of the river and its natural resources are chronicled.

The status of pollution of the Ohio River is described in the next four articles in this special issue. Teresa Cavanaugh and I of the The Ohio State University describe the recent changes, some positive, of water quality in "Water Quality Trends of the Upper Ohio River from 1977 to 1987." While many have suggested that the river has been improving lately in its post-industrial period, few scientific inquiries have been made to attribute statistical significance to the trends. Joseph Wellner and James Dinger of the University of Kentucky and the Kentucky Geological Survey observed dissolved oxygen patterns of the Ohio River, primarily from data collected during the 1987 "Boatload of Knowledge" trip, in an article entitled "Dissolved Oxygen Profiles at Major Wastewater Discharges and Hydroelectric Dams on the Ohio River." They found generally adequate levels of oxygen in the river and very little impact of major discharges or hydroelectric dams. John Youger and I describe "Heavy Metal Concentrations in Ohio River Sediments—Longitudinal and Temporal Patterns," also based primarily on samples taken between Pittsburgh and Louisville on the 1987 "Boatload of Knowledge" trip. Once again, the river is shown to be generally cleaner than it was a decade ago, but with a long way to go before it can be considered clean. Marcus Waldron and Alan White present a case study of a major industrial tributary of the Ohio River in their article "Non-Volatile Chemical Mutagens in Sediments of the Kanawha River, West Virginia." As the site of one of the largest chemical manufacturing complexes in the world, the Kanawha River is explored for its local contamination of sediments and as a site for an application of the Ames mutagenicity test for screening biologically hazardous conditions.

The Ohio River and its valley have clear longitudinal patterns of ecological diversity and subtle changes in that diversity over the years. Description of the diversity is aided through studies by some of the country's first naturalists, beginning in the early 19th century. The fish and benthic mussels of the river and bird communities of its valley are described in the final three articles in this special issue. "Fishes of the Ohio River" by William Pearson of University of Louisville and Juanelle Pearson of Spaulding University chronicles the recovery of many fish populations in the river as water quality has improved over the past decade. All except one of the 52 species described by Constantine Rafinesque have been reported in the river in the last twenty years. Ralph Taylor from Marshall University

[1]New York Times, Sunday November 20, 1955, Section 3.

[2]Quote attributed to Robert Owens on January 12, 1826, New Harmony, Indiana.

describes "Changes in Freshwater Mussel Populations of the Ohio River: 1,000 BP to Recent Times," presenting the natural history of freshwater mussels in the Ohio River from literature records and his own extensive sampling over the years. Taylor, who was also the boat captain of the vessel in our modern "Boatload of Knowledge" trip, suggests that the changes in the river, particularly pollution and navigational dams, have led to the extirpation of at least 16 species of mussels from the upper Ohio River. "Birds in the Ohio River Valley: Possible Indicators of Environmental Quality," the final paper in this special volume, is presented by David Todt of Shawnee State University, another participant in the "Boatload of Knowledge" voyage. Data, collected in part by him and his peers during the 1987 voyage, suggests that the numbers and diversity of birds along the river valley are good indicators of the relative environmental conditions (water and air pollution) as well as monitors of the general differences in climate as one proceeds downriver from Pittsburgh to Louisville.

We trace this publishing effort, beginning with the organization of our "Boatload of Knowledge," to the support from many individuals and organizations. The Virginia Environmental Endowment, through its Executive Director Jerry McCarthy, provided the financial support that made our "Boatload of Knowledge" voyage possible. The Ohio State University's School of Natural Resources provided in-kind support of my time. The Ohio Academy of Science, particularly its Executive Director Lynn Elfner, Editor Lee A. Meserve, and *The Journal* Editorial Board, was supportive and encouraging in this effort to organize authors, topics, and a central theme to a special issue of *The Ohio Journal of Science.* The Ohio River Basin Consortium for Research and Education,[3] whose universities and member organizations contributed the majority of the authors and participants in this Ohio River adventure in science, was the glue that held it all together. Teresa Cavanaugh Donkin, Julie Cronk, and Craig Brechbuhler were especially helpful graduate students in this publishing endeavor.

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[3]The Ohio River Consortium is described in some detail in Nichols, A.B. 1989. Consortium champions a major river basin. J. Water Poll. Control Fed. 61:316-319.